

Indian Point Unit 3 Stretch Power Uprate



License Amendment Request NRC – Entergy Review Meeting

September 14, 2004



Agenda

Introductions

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 - Operational Comparison
 - System/Equipment Considerations Comparison
 - Reliability & Efficiency Improvements Comparison
 - Summary of Modifications
7. Feedback/Questions & Answers

Meeting Objective

Support NRC efforts to review and approve the Indian Point Unit 3 Stretch Power Uprate LAR by March 2005 - prior to start of the 3R13 Refueling Outage.

Key Perspectives

- Licensed “Stretch” increase of 4.85% to 3216 MWt.
- Licensed core power will be no greater than the *original* maximum calculated reactor power.
- Format, content, and methodologies *very* similar to separate IP2 SPU submittal.
- Incorporated IP2 SPU lessons learned and NRC Feedback.
- Took a “Defense in Depth” approach to quality measures.
- Design and licensing bases acceptance criteria remain the same and continue to be met for IP3 systems, components, and safety analyses.
- No Significant Hazards per 10CFR50.92.

Project Objectives

- Safely support and implement a ~4% increase in the licensed core thermal power for IP3 at the start of Cycle 14 (Phase 1).
- Support Entergy's strategy of providing much-needed additional electricity to the Northeast Region, particularly Metropolitan New York City.

NRC Requested Approvals

Stretch Power Uprate

- 3216 MWt Licensed Core Power
- 10-Minute Operator Action
- Associated Tech Specs
- No New NRC Licensing Commitments

Alternate Source Term

- Associated Tech Specs
- Methodology and Assumptions
- Dose Limits

SPU Tech Spec and Bases Changes

- RPS and ESFAS Allowable Values
- RCS Minimum Flow
- Pressurizer Water Level Limit
- Power Limit for Inoperable MSSVs
- ILRT Pressure Limit
- Relocate Certain Tech Spec Parameters to COLR
According to TSTF-339

IP2 & IP3 Summary Comparison

- Licensed Core Power
- NSSS Analyses Inputs
- NSSS Analyses Methodology
- NSSS Analyses Results
- BOP Summary
- Operational Comparison
- System/Equipment Considerations Comparison
- Reliability & Efficiency Improvements Comparison
- Summary of Modifications

Licensed Core Power

IP2 Stretch

- MWt: 3114.4 to 3216

IP3 Stretch

- MWt: 3067.4 to 3216

➤ Phase I ~4%

➤ Phase II ~0.85%

IP2 and IP3 NSSS Inputs

Parameter	IP2		IP3	
	Current Value	SPU Value	Current Value	SPU Value
Licensed Reactor Thermal Power	3114.4 MWt	3216 MWt	3067.4 MWt	3216 MWt
Power Calorimetric Uncertainty	0.6%	2.0%	0.6%	2.0%
Reactor Vessel Tavg Analysis Range	549.4°F - 579.2°F	549.0°F - 572.0°F	567°F - 574.7°F	549.0°F - 572.0°F
Actual Full-Power Programmed Tavg	562°F \pm 3°F	562°F \pm 3°F	567°F	567°F + 3°F
Assumed Maximum SG Tube Plugging	20%	10%	30%	10%
Maximum Steam Flow (lbm/hr)	13.48E06 - 13.56E06	14.01E06 - 14.07E06	13.24E06	13.14E06 - 13.99E06
ITS RWST Boron Concentration	2000ppm - 2500ppm	2400ppm - 2600ppm	2400ppm - 2600ppm	2400ppm - 2600ppm

IP2 and IP3 Analyses Methodology Changes

SUMMARY OF NSSS METHODS AND INPUTS				
Analysis	IP2		IP3	
	Current	SPU	Current	SPU
Non-LOCA Transient Code	LOFTRAN	RETRAN / LOFTRAN	LOFTRAN	RETRAN / LOFTRAN
BE LBLOCA Code / Approach	WCOBRA- TRAC Anal.	WCOBRA- TRAC Eval.	WCOBRA- TRAC Anal.	WCOBRA- TRAC Anal.
SBLOCA Evaluation Model	EM	EM + COSI	EM	EM + COSI
Operator Action for LONF/LOAC	Not Credited	10 Minutes	Not Credited	10 Minutes
Containment Peak Pressure - LOCA	COCO	COCO	COCO	COCO
Containment Peak Pressure - MSLB	COCO	COCO	COCO	COCO
HLSO Time	Generic	Specific	Specific	Specific
Radiological Dose Analysis	AST Draft RG 1081 "Plus"	AST Final RG 1.183	Misc. Reg. Guides (e.g. 1.4, 1.25, 1.77)	AST Final RG 1.183

IP2 and IP3 Analyses Results

SUMMARY OF NSSS ANALYSES RESULTS				
Analysis	IP2		IP3	
	Current	SPU	Current	SPU
BE LBLOCA	2176°F PCT	2137°F PCT	2174°F	2014°F PCT
SBLOCA	2116°F PCT	1028°F PCT	1526°F	1543°F PCT
Operator Action for LONF/LOAC	NO PRZR FILL	NO PRZR FILL	NO PRZR FILL	NO PRZR FILL
Containment Peak Pressure - LOCA	43.0 psig	45.7 psig	38.77 psig	42.0 psig
Containment Peak Pressure - MSLB	46.7 psig	38.9 psig	42.1 psig	39.2 psig
HLSO Time	24 Hrs	6.5 Hrs	14 Hrs	6.5 Hrs
Radiological Dose Analysis	< TEDE Limits	< TEDE Limits	< Thyroid and Whole-Body Dose Limits	< TEDE Limits

Operational Comparison

IP2 Stretch Uprate

- Restored 2% power uncertainty to analyses for improved safety and operational margin.
- Hot Leg Safety Injection switch over completion time from 24 to 6.5 hours. (EOPs)
- 10 Minute Operator Action for AFW Flow

IP3 Stretch Uprate

- Same
- Start HLSO at 14 hours, complete by 24 hours - to start at 4 hours, complete at 6.5 hours
- Same

BOP Summary

- The initial NRC questions and NRC RAIs on the IP2 SPU submittal were considered when preparing the IP3 SPU LAR.
- Known industry issues related to Systems and Programs were considered in the IP3 SPU LAR.
- Strengthened the Acceptance Criteria, Design Criteria and Results/Conclusions sections of the IP3 LAR.
- The Piping Vibration Plan for IP3 will be similar to that used for IP2.

System/Equipment Considerations Comparison

IP2 Stretch Uprate

- Components were added to Flow Accelerated Corrosion (FAC) program.
- Power uprate had no appreciable affect on EQ program.
- Main Feedwater Block valves (BFD-5's) were added to MOV program to take credit for closure on feedwater isolation.
- SI System analysis addressed the recirculation sump particle criteria and system throttle valve cavitation issues for the as-set system conditions.

IP3 Stretch Uprate

- Same
- Same
- Main Feedwater Block valves already in MOV program and credited in analysis
- HHSI modifications are being implemented

Reliability & Efficiency Improvements Comparison

IP2 Stretch Uprate

- HP Turbine
- Moisture Separator Reheater
Internals changed to chevron
design
- Iso Phase Bus Duct cooling
upgrade Main Power
- Transformer Monitoring

IP3 Stretch Uprate

- Same upgrade to HP Turbine
- Same upgrade to MSRs
- Phase 2 only
- Similar modifications planned

Summary of Modifications

IP2

- HPT Steam Path
- Moisture Separator Reheater Internals
- Main Power Transformer Monitoring
- Setpoint / Instrument Changes
- Iso Phase Bus Duct Cooling
- MW Meter Replacement
- RCS RTD Replacement

IP3

- HPT Steam Path
- Moisture Separator Reheater Internals
- Main Power Transformer Monitoring
- Setpoint / Instrument Changes
- HHSI flow balancing
- CCR Charcoal Filter Upgrade

Feedback

RAI Process Discussion

Questions and Answers